Claims

1. Catalyst including at least one hydro-dehydrogenating element chosen from the group formed by the group VIB and group VIII elements of the periodic table and a substrate based on at least one zeolite and based on a silica-alumina matrix, said matrix containing a quantity greater than 5% by weight and less than or equal to 95% by weight of silica (SiO_2), said catalyst having the following characteristics:

- a mean pore diameter, measured by mercury porosimetry, of between 20 and 140 Å,

- a pore distribution such that the ratio between the volume V2, measured by mercury porosimetry, comprised between D_{mean} - 30 Å and D_{mean} + 30 Å to the total volume measured by mercury porosimeter intrusion, is more than 0.6 - the volume V3, measured by mercury porosimetry, contained in the pores with diameters greater than D_{mean} + 30 Å, is less than 0.1 ml/g - the volume V6, measured by mercury porosimetry, contained in the pores with diameters greater than D_{mean} + 15 Å, is less than 0.2 ml/g,

- a total pore volume, measured by mercury porosimetry, comprised between 0.2 ml/g and 0.5 ml/g,

- a total pore volume, measured by nitrogen porosimetry, comprised between 0.2 ml/g and 0.5 ml/g,

- a BET specific surface area comprised between 100 and 600 m^2/g,

- a pore volume, measured by mercury porosimetry, contained in the pores with diameters of more than 140 Å, of less than 0.1 ml/g,

- a pore volume, measured by mercury porosimetry, contained in the pores with diameters of more than 160 Å, of less than 0.1 ml/g,

- a pore volume, measured by mercury porosimetry, contained in the pores with diameters of more than 200 Å, of less than 0.1 ml/g,

- a pore volume, measured by mercury porosimetry, contained in the pores with diameters of more than 500 Å, of less than 0.01 ml/g,

- a packing density of the catalysts greater than 0.85 g/cm^3,

- an X-ray diffraction diagram which contains at least the main lines characteristic of at least one of the transition aluminas that are included in the group composed of alpha, rho, chi, eta, gamma, kappa, theta and delta aluminas.

2. Catalyst according to Claim 1 in which the proportion of octahedral Al_{VI} determined by analysis of the NMR MAS spectra of the ^{27}Al solid of the matrix is more than 50%.

3. Catalyst according to Claims 1 to 2 based on nickel and tungsten.

4. Catalyst according to Claims 1 to 2 based on nickel and molybdenum.

5. Catalyst according to any one of the preceding claims which includes at least one doping element selected from the group formed by phosphorus, boron and silicon and deposited on the catalyst.

6. Catalyst according to Claim 5 in which the doping element is phosphorus.

7. Catalyst according to any one of the preceding claims which contains between 0.1 and 30% by weight of zeolite.

8. Catalyst according to any one of the preceding claims in which the substrate is based on Y zeolite.

9. Catalyst according to any one of the preceding claims in which at least one zeolite is chosen from the group formed by the zeolites ZSM-48, ZBM-30, EU-2, EU-11.

10. Catalyst according to any one of the preceding claims in which at least one zeolite is the zeolite ZBM-30.

11. Catalyst according to any one of the preceding claims in which at least one zeolite is chosen from the group formed by the zeolites Mordenite, Beta, NU-87, EU-1.

12. Substrate including:

- at least one zeolite,

- a non-zeolitic matrix based on silica-alumina containing a quantity greater than 5% by weight and less than or equal to 95% by weight of silica (SiO2),

characterised by:

- a mean pore diameter, measured by mercury porosimetry, of between 20 and 140 Å,

- a pore distribution such that the ratio between the volume V2, measured by mercury porosimetry, comprised between D_{mean} - 30 Å and D_{mean} + 30 Å, to the total volume measured by mercury porosimeter intrusion, is more than 0.6 - the volume V3, measured by mercury porosimetry, contained in the pores with diameters greater than D_{mean} + 30 Å, is less than 0.1 ml/g - the volume V6, measured by mercury porosimetry, contained in the pores with diameters greater than D_{mean} + 15 Å, is less than 0.2 ml/g,

- a total pore volume, measured by mercury porosimetry, comprised between 0.2 ml/g and 0.5 ml/g,

- a total pore volume, measured by nitrogen porosimetry, comprised between 0.2 ml/g and 0.5 ml/g,

- a BET specific surface area comprised between 100 and 650 m^2/g,

- a pore volume, measured by mercury porosimetry, contained in the pores with diameters of more than 140 Å, of less than 0.1 ml/g,

- a pore volume, measured by mercury porosimetry, contained in the pores with diameters of more than 160 Å, of less than 0.1 ml/g,

- a pore volume, measured by mercury porosimetry, contained in the pores with diameters of more than 200 Å, of less than 0.1 ml/g,

- a pore volume, measured by mercury porosimetry, contained in the pores with diameters of more than 500 Å, of less than 0.01 ml/g,

- a packing density of the substrates, after calcination, greater than 0.65 g/cm^3,

- an X-ray diffraction diagram which contains at least the main lines characteristic of at least one of the transition aluminas that are included in the group composed of rho, chi, eta, gamma, kappa, theta and delta aluminas.

13. Substrate according to Claim 12 such that the X-ray diffraction diagram contains at least the main lines characteristic of at least one of the transition aluminas that are included in the group composed of eta, theta, delta and gamma aluminas.

14. Substrate according to any one of Claims 12 to 13 such that the X-ray diffraction diagram contains at least the main lines characteristic of at least one of the transition aluminas that are included in the group composed of eta and gamma aluminas.

15. Substrate according to any one of Claims 12 to 14 such that the mean pore diameter is between 40 and 120 Å.

16. Substrate according to any one of Claims 12 to 15 such that the matrix contains at least two silica-alumina zones having Si/Al ratios that are less than or greater than the overall Si/Al ratio determined by X-ray fluorescence.

17. Substrate according to any one of Claims 12 to 16 such that the matrix contains a single silica-alumina zone having an Si/Al ratio equal to the overall Si/Al ratio determined by X-ray fluorescence and less than 2.3.

18. Hydrocracking and/or hydroconversion process for hydrocarbon feedstocks using the catalyst according to one of Claims 1 to 11 or the catalyst containing the substrate according to one of claims 12 to 17.

19. Hydrocracking and/or hydroconversion process according to Claim 18 conducted by the so-called single-stage process.

20. Hydrocracking and/or hydroconversion process according to Claim 18 including at least one first hydrorefining reaction zone and at least one second reaction zone including hydrocracking of at least part of the effluent from the first zone and including incomplete separation of the ammonia from the effluent leaving the first zone.

21. Hydrocracking and/or hydroconversion process according to one of Claims 19 or 20 including:

- a first hydrorefining reaction zone in which the feed is contacted with at least one hydrorefining catalyst presenting in the standard activity test a cyclohexane conversion rate of less than 10% by mass,

- a second hydrocracking reaction zone in which at least a part of the effluent leaving the hydrorefining stage is contacted with at least one zeolitic hydrocracking catalyst presenting in the standard activity test a cyclohexane conversion rate of more than 10% by mass, the catalyst according to the invention being present in at least one of the two reaction zones.

22. Hydrocracking and/or hydroconversion process according to Claim 18 in the so-called two-stage process.

23. Process according to any one of Claims 18 to 22 operating, in the presence of hydrogen, at a temperature more than 200°C, at a pressure more than 1 MPa, the space velocity being comprised between 0.1 and 20h^{-1}, and the quantity of hydrogen introduced is such that the volume ratio litre of hydrogen / litre of hydrocarbon is comprised between 80 and 5000 l/l.

24. Hydrocracking and/or hydroconversion process according to any one of Claims 18 to 23 operating at a pressure comprised between 2 and 6 MPa and leading to conversions less than 50%.

25. Process according to any one of Claims 18 to 24 operating in fixed bed.

26. Process according to any one of Claims 18 to 24 operating in ebullated bed.

27. Process according to any one of Claims 18 to 26 in which the catalyst used for hydrocracking is based on platinum and/or palladium.

28. Hydroprocessing process for hydrocarbon feedstocks using the catalyst according to any one of Claims 1 to 11 or the catalyst containing the substrate according to any one of Claims 12 to 17.

29. Process according to Claim 28 placed upstream of a hydrocracking process.

30. Process according to any one of Claims 18 to 29 in which the hydrocarbon feedstocks are chosen from the group formed by LCO (light cycle oil), atmospheric distillates, vacuum distillates, feeds from aromatic extraction units from base lubricating oils or derived from solvent dewaxing of base lubricating oils, distillates derived from processes of desulphurisation or fixed bed or ebullated bed hydroconversion of atmospheric residues and/or vacuum residues and/or deasphalted oils, deasphalted oils, alone or in a mixture.